Chemistry
Ticket Out the Door
Set 15: Periodic Trends

Name _____ Period _____

Skill 15.01 Problem 1

(a) Which side of the periodic table is associated with nonmetals? Metals?

(b) Identify whether each of the following is a metal, nonmetal, metalloid, or noble gas

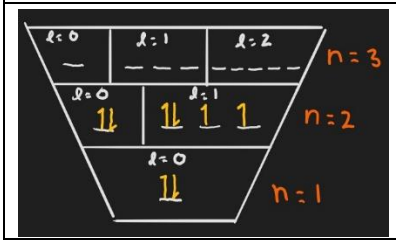
Silicon

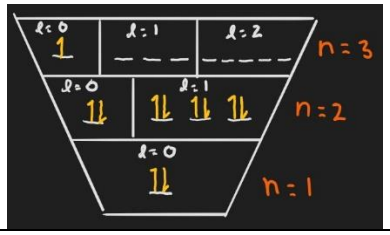
Sodium

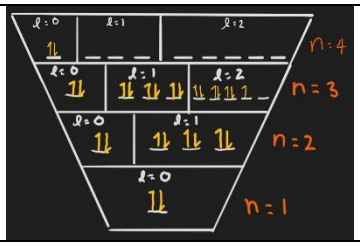
Sulfur

Xenon

(c) Based on the electron arrangement of the electrons, indicate whether each atom is a metal or nonmetal.

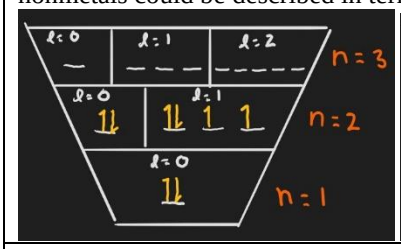


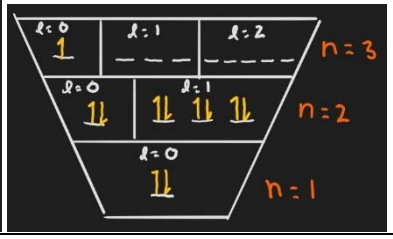


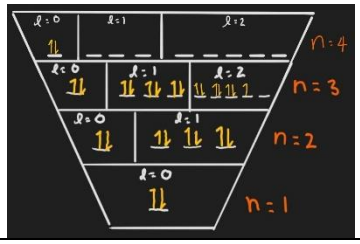


Skill 15.02 Problem 1

Metals, nonmetals, and metalloids can be described in terms of the above descriptions. Below are models that depict the arrangement of electrons in metals in nonmetals. Propose how metals and nonmetals could be described in terms of their electron arrangements.

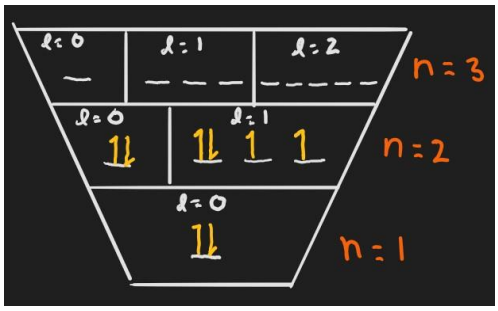


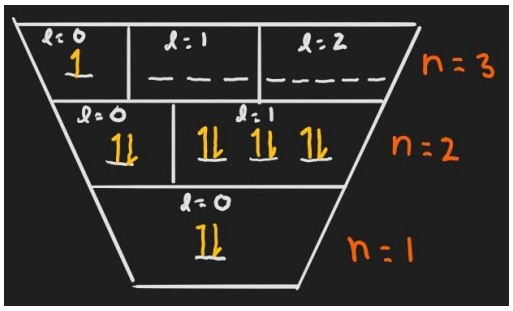




Skill 15.03 Problem 1

The diagrams below show the arrangement of electrons for different atoms. Complete the following based the diagrams.

I. 

II. 

(a) For each atom circle the outer most electron(s).

(b) For which atom are the outer electrons most attracted to the nucleus? Explain.

(c) Both atoms shown are unstable. For each atom, indicate whether losing or gaining electrons would increase the stability of the atom.

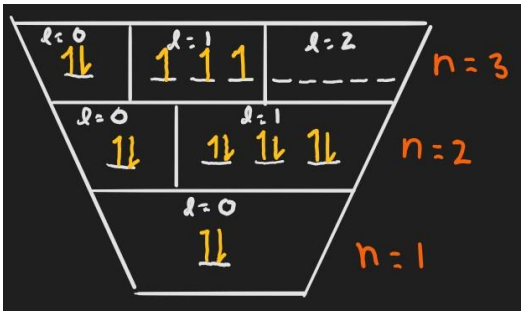
Skill 15.04 Problem 1

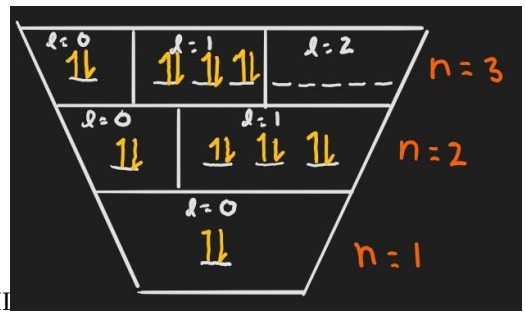
(a) Arrange the following in order from low to high with respect to ionization energy. Justify your reasoning in terms of atomic principles.

Na, Li, K, Cs, Rb

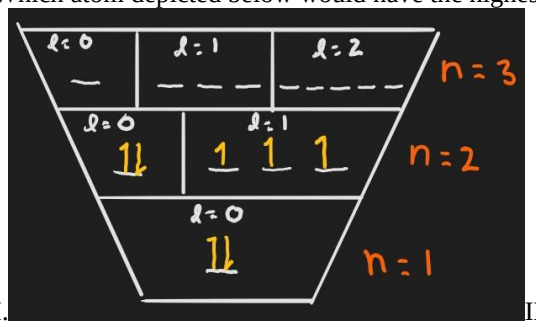
Cl, Na, Al, S, Mg

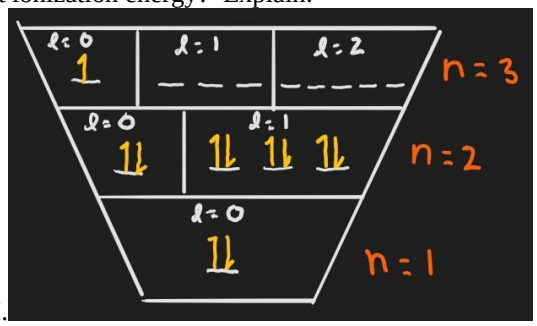
Which atom depicted below would have the highest ionization energy? Explain.

I. 

II 

Which atom depicted below would have the highest ionization energy? Explain.

I. 

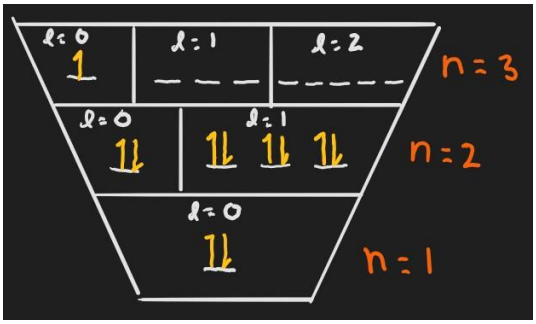
II. 

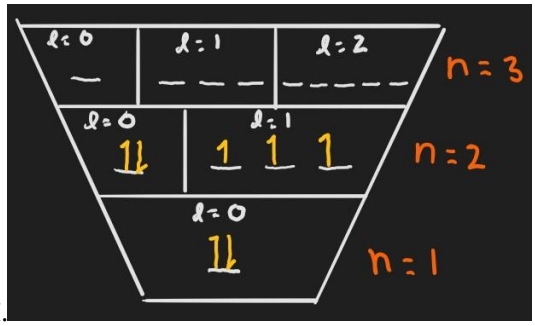
Skill 15.05 Problem 1

The first three ionization energies of some element are as follows:

I_1 = 520 kJ/mol, I_2 = 7300 kJ/mol, I_3 = 11815 kJ/mol

Which atom shown below is most consistent with the data? Explain.

I. 

II. 

The first five ionization energies of some element are as follows:

I_1 = 1086 kJ/mol, I_2 = 2350 kJ/mol, I_3 = 4620 kJ/mol, I_4 = 6220 kJ/mol, I_5 = 38,000kJ/mol

To which group does this element belong? Explain.

Skill 15.05 Problem 2

Consider the following electronic configurations for 3 different neutral atoms.

$1s^2 2s^2 2p^6$
$1s^2 2s^2 2p^6 3s^1$
$1s^2 2s^2 2p^6 3s^2$

(a) Which atom has the largest first ionization energy? Explain.

(b) Which atom has the smallest first ionization energy? Explain.

(c) Which atom has the largest second ionization energy? Explain.

Skill 15.06 Problem 1

Arrange the following from low to high with respect to atomic radius. Justify your reasoning.

Mg, Na, Ar, Al	Rb, K, Li, Cs

Skill 15.07 Problem 1

(a) Which of the following has the smallest atomic radius? Explain.

Ne, O^{2-}, Na^{+}, Mg^{2+}

(b) Which of the following has the smallest atomic radius? Explain.

Al^{3+}, Ne, O^{2-}, N^{3-}

Skill 15.08 Problem 1

Arrange the following from low to high with respect to electronegativity.
(a) I, Cl, F, Br
(b) F, Mg, Na, Cl